

U.S. Patent Application Serial No. **10/087,913**
Supplemental Amendment dated February 6, 2004
Reply to OA of **February 2, 2004**

IN THE CLAIMS:

Please cancel claims 1-9 without prejudice or disclaimer.

Please add new claims 18-34 as follows:

Claims 1-9 (Currently Canceled).

Claim 10 (Withdrawn): An electronic device comprising a conductive composition layer having:

a region of a metal or alloy having a melting point of 230°C or higher,

a region of an alloy having a melting point lower than 230°C; and

a region comprising a thermoset resin and/or thermoplastic resin,

wherein at least one portion of the upper surface and one portion of the lower surface of said conductive composition layer are linked to each other by a region of said alloy having a melting point lower than 230°C.

Claim 11 (Withdrawn): An electronic device according to claim 10, wherein:

said region of said metal or alloy having a melting point of 230°C or higher is composed of at least any one material selected from the group consisting of Sn, Bi, and Pb; and

said region of said alloy having a melting point lower than 230°C is composed of an alloy resulting from combination of at least any two materials selected from the group consisting of Sn, Bi, In, and Pb.

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Claim 12 (Withdrawn): An electronic device having conductive composition layer obtained by heat-treating, at a temperature below 230°C, a conductive composition comprising:

said conductive particles described in claim 1; and

a thermosetting resin having a curing temperature lower than 230°C and/or a thermoplastic resin having a melting point lower than 230°C.

Claim 13 (Withdrawn): An electronic device according to any one of claims 10 to 12, wherein said thermosetting resin having a curing temperature lower than 230°C and/or said thermoplastic resin having a melting point lower than 230°C, or, alternatively, said thermoset resin and/or thermoplastic resin, is at least one resin selected from the group consisting of epoxy-based, phenolic-based and acrylic-based thermosetting resins or thermoset resins thereof, and polyethylene type, polyester type, polypropylene type and acrylic type thermoplastic resins.

Claim 14 (Withdrawn): An electronic device having a conductive composition layer described in claim 10 between at least one combination of a semiconductor device and a cooling member, a semiconductor device and a substrate, and a lead terminal and a substrate.

Claim 15 (Withdrawn): An electronic device manufacturing method comprising:
subjecting to bonding a conductive composition comprising conductive particles as described in any one of claims 1 to 6, and a thermosetting resin having a curing temperature lower than 230°C

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and/or a thermoplastic resin having a melting point lower than 230°C; and

performing a heat treatment on said composition, wherein provision is made so that a layer made of said composition exhibits conductivity when said heat treatment is finished.

Claim 16 (Withdrawn): An electronic device manufacturing method according to claim 15, wherein said heat treatment is performed at a temperature below 230°C.

Claim 17 (Withdrawn): An electronic device manufacturing method according to claim 15, wherein said thermosetting resin having a curing temperature lower than 230°C and/or said thermoplastic resin having a melting point lower than 230°C is at least one resin selected from the group consisting of epoxy-based, phenolic-based, and acrylic-based thermosetting resins, and polyethylene type, polyester type, polypropylene type and acrylic type thermoplastic resins.

Claim 18 (New): Conductive particles consisting essentially of:

a base material comprising one or more members selected from the group consisting of: Bi, In, Pb, and alloys thereof; and

a coating material comprising one or more members selected from the group consisting of Sn, In, Bi, Pb, and alloys thereof;

wherein said coating material is provided on said base material such that said coating material and said base material are in mutual contact.

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Claim 19 (New): Conductive particles consisting essentially of:

a base material comprising one or more members selected from the group consisting of: Sn, Bi, In, Pb, and alloys thereof; and

a coating material comprising two or more members selected from the group consisting of Sn, In, Pb, Bi, and alloys thereof;

wherein said coating material is provided on said base material such that said coating material and said base material are in mutual contact.

Claim 20 (New): Conductive particles consisting essentially of:

a base material comprising one or more members selected from the group consisting of: Sn, Bi, In, Pb, and alloys thereof; and

a coating material comprising one or more members selected from the group consisting of Sn, Pb, and alloys thereof;

wherein said coating material is provided on said base material such that said coating material and said base material are in mutual contact.

Claim 21 (New) Conductive particles consisting essentially of:

a base material consisting of a metal that is a simple substance selected from the group consisting of: Sn, In, Bi, and Pb; and

a coating material comprising one or more members selected from the group consisting of

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Sn, In, Bi, Pb and alloys thereof;

wherein said coating material is provided on said base material such that said coating material and said base material are in mutual contact.

Claim 22 (New): The conductive particles of any one of claims 18, 19, 20 or 21, wherein said base material and said coating material are capable of producing an alloy having a melting point lower than 230°C by being heated at a temperature lower than 230°C.

Claim 23 (New): The conductive particles of any one of claims 18, 19, 20 or 21, wherein said coating material has a film thickness corresponding to 5% or greater of the average particle size of the base material.

Claim 24 (New): The conductive particles of claim 23, wherein said coating material has a film thickness corresponding to 5% to 15% of the average particle size of the base material.

Claim 25 (New): The conductive particles of any one of claims 18, 19, 20 or 21, wherein said coating material has a film thickness of from 0.5 μm to 4.0 μm .

Claim 26 (New): The conductive particles of claim 25, wherein said coating material has a film thickness of from 2.0 μm to 4.0 μm .

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Claim 27 (New): A conductive composition, comprising:
conductive particles comprising at least two materials selected from the group consisting of
Sn, Bi, In, Pb, and alloys thereof, said at least any two materials being in mutual contact; and
a resin composition comprising one or more members selected from the group consisting of
a thermosetting resin having a curing temperature lower than 230°C and a thermoplastic resin having
a melting point lower than 230°C.

Claim 28 (New): The conductive composition of claim 27, wherein said resin composition
comprises at least one member selected from the group consisting of: epoxy-based thermosetting
resins, phenolic-based thermosetting resins, acrylic-based thermosetting resins, polyethylene type
thermoplastic resins, polyester type thermoplastic resins, polypropylene type thermoplastic resins,
and acrylic type thermoplastic resins.

Claim 29 (New): The conductive composition of claim 27, wherein said curing temperature
and/or said melting point, are in the range of from 100°C to 200°C.

Claim 30 (New): The conductive composition of claim 27, wherein said resin composition
comprises 10 to 100 parts by weight based on 100 parts by weight of said conductive particles.

Claim 31 (New): The conductive composition of claim 30, wherein said resin composition

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comprises 10 to 40 parts by weight based on 100 parts by weight of said conductive particles.

Claim 32 (New): The conductive composition of claim 27, wherein said at least two materials comprise at least one base material and at least one coating material, where said coating material is provided on said base material to form a coating.

Claim 33 (New): The conductive composition of claim 32, wherein said coating material has a film thickness corresponding to 5% or greater of the average particle size of the base material.

Claim 34 (New): The conductive composition of claim 32, wherein said coating material has a film thickness of from 0.5 μm to 4.0 μm .